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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. |
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09/442,499 11/18/99 HO

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IM22/1107

EXAMINER

GOUDREAU, G

ART UNIT

PAPER NUMBER

10

1763

DATE MAILED:

11/07/01

Please find below and/or attached an Office communication concerning this application or proceeding.

Commissioner of Patents and Trademarks

Office Action Summary

| | | | |
|-----------------|----------------------|--------------|----|
| Application No. | 09-442499 | Applicant(s) | Ho |
| Examiner | George Goudreau 1763 | | |
| Group Art Unit | | | |

—The MAILING DATE of this communication appears on the cover sheet beneath the correspondence address—

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, such period shall, by default, expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

Responsive to communication(s) filed on 8-01' (ie, - paper # 9)

This action is FINAL

Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 1:1; 453 O.G. 213.

Disposition of Claims

Claim(s) 2-5, 8-10, 13-15, 17-34 is/are pending in the application.

Of the above claim(s) _____ is/are withdrawn from consideration.

Claim(s) _____ is/are allowed.

Claim(s) 2-5, 8-10, 13-15, 17-34 is/are rejected.

Claim(s) _____ is/are objected to.

Claim(s) _____ are subject to restriction or election requirement

Application Papers

The proposed drawing correction, filed on _____ is approved disapproved.

The drawing(s) filed on _____ is/are objected to by the Examiner

The specification is objected to by the Examiner.

The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. § 119 (a)-(d)

Acknowledgement is made of a claim for foreign priority under 35 U.S.C. § 119 (a)-(d).

All Some* None of the:

Certified copies of the priority documents have been received.

Certified copies of the priority documents have been received in Application No. _____.

Copies of the certified copies of the priority documents have been received

in this national stage application from the International Bureau (PCT Rule 17.2(a))

*Certified copies not received: _____

Attachment(s)

Information Disclosure Statement(s), PTO-1449; Paper No(s). _____

Interview Summary, PTO-413

Notice of Reference(s) Cited, PTO-892

Notice of Informal Patent Application, PTO-152

Notice of Draftsperson's Patent Drawing Review, PTO-948

Other _____

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15. Claims 2-5, 8-10, 13-15, and 17-34 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

-The usage of bracketed letters or bracketed terms in the claims (i.e. - claims 20-21, 26-27, 32-33) for reasons other than to delete subject matter from a claim or to refer to numerals in figures in the specification is incorrect, and should be deleted.; and

-The wording used in part 2 of claims 21, 27, and 33 is confusing, and should be reworded. Applicant refers to both the etching step, and the seasoning step in part 2 of claims 21, 27, and 33 which makes it difficult for the examiner to ascertain if the gasses recited in this step are used in the etching step or if they are used in the seasoning step.

16. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

17. Claims 2-5, 8-10, 13-15, and 17-34 are rejected under 35 U.S.C. 103(a) as being unpatentable over Soga (6,090,718).

Soga et. al. disclose a process for rie etching a trench in a Si wafer (2) using a SiO₂ hard mask (1); and a plasma comprised of (HBr-SiF₄-SF₆-O₂). The rie etching chamber is cleaned after each wafer is rie etched before processing additional wafers through the rie etcher. The rie etcher is cleaned using a cleaning/seasoning/purge process. The interior surfaces of the rie etcher

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are cleaned by placing a dummy Si/SiO₂ wafer in the rie etcher; and discharging an SF₆ gas. This cleaning step removes etch by products left from prior rie etching steps on the interior surfaces of the rie etching apparatus as well as the seasoning layer which was deposited onto the interior surfaces of the rie etching apparatus. The interior surfaces of the rie etcher are then seasoned by discharging a plasma comprised of (HBr-SiF₄-SF₆-O₂) in the presence of a dummy Si/SiO₂ wafer. The rie etcher is then purged of process gasses prior to processing additional wafers through the rie etcher. The 2nd wafer is then rie etch in the rie etcher. The cleaning process disclosed above is then repeated. The Si wafer is etched in the formation of microelectronics. This is discussed specifically in columns 4-12; and discussed in general in columns 1-18. This is shown in figures 2-19. Soga et. al. fail, however, to specifically disclose the following aspects of the applicant's claimed invention:

- the specific formation of seasoning films on the interior surfaces of the rie etching apparatus with the specific composition which are claimed by the applicant;
- the specific dry etching of a polysi layer or a CZ-Si layer on a wafer in a plasma comprised of compounds capable of generating free Br or Cl;
- the specific usage of the type of plasma etching apparatus which is claimed by the applicant;
- the specific usage of the plasma seasoning, and plasma etching process parameters which are claimed by the applicant; and
- the specific processing of 8" diameter wafers in the process taught above

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It would have been inherent that the Si wafer in which the trench is etched in the process taught above is comprised of CZ-Si since the Si wafers which are used to form semiconductors are made of CZ-Si. The examiner cites the case law listed below of interest to the applicant in this regard.

In re Swinehart (169 U.S.P.Q. 226 (CCPA)) and In re Best (195 U.S.P.Q. 430 (CCPA)) state that when an examiner has reasonable basis for believing that functional characteristics asserted to be critical for establishing novelty in the claimed subject matter may, in fact, be inherent characteristics of the prior art, the examiner possesses the authority to require an applicant to prove that the subject matter shown to be in the prior art does not possess the characteristics relied upon.

It would have been inherent that a polymeric film comprised of at least Br-Si-O would have formed on the interior surfaces of the rie etcher in the process taught above based upon the following. A dummy wafer is rie etcher in the presence of a plasma comprised of free F, Br, O, Si during the seasoning step which would have been expected to have formed films on the interior surfaces of the rie etcher which are comprised of any combination of these elements during the seasoning step. This would have included films comprised of Si-Br-O, and Si-Br as well as other types of films. The examiner cites In re Swinehart of interest to the applicant in this regard.

It would have been obvious to one skilled in the art to employ the rie etching process taught above to rie etch either a polysi film or a CZ-Si film on a Si wafer based upon the following. The rie etching of polysi films, and CZ-Si films on a Si wafer is conventional or at least

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well known in the semiconductor processing arts. (The examiner takes official notice in this regard.) Further, the rie etching process taught above would have been expected to have been suitable for rie etching a polysi film on a wafer since it is taught as being suitable for rie etching another type of Si compound (i.e.-CZ-Si) whose chemical reactivity should have been very similar to that of the polysi.

It would have been obvious to one skilled in the art to employ the specific type of etching apparatus which is claimed by the applicant to conduct the etching process taught above based upon the following. The usage of the specific type of plasma etching apparatus which is claimed by the applicant is conventional or at least well known in the plasma etching arts. (The examiner takes official notice in this regard.) Further, the specific usage of the type of plasma etching apparatus which is claimed by the applicant would have simply involved the usage of an alternative, and at least equivalent means for conducting an etching process to those means which are specifically taught above.

It would have been obvious to one skilled in the art to employ a plasma etching apparatus which is capable of processing a variety of different size wafers including those which are 8" in diameter based upon the following. The processing of 8" diameters wafers in a plasma etcher is conventional or at least well known in the plasma etching arts. (The examiner takes official notice in this regard.) Further, it would have been desirable to process wafers which are 8" in diameter since this is common size used for the processing a wafers used to make IC's.

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It would have been *prima facie* obvious to employ any of a variety of different process parameters in the plasma etching, and plasma seasoning processes taught above including those which are specifically claimed by the applicant. These are all well known variables in the plasma etching/ plasma seasoning arts which are known to effect both the rate and quality of the plasma etching/ plasma seasoning processes. Further, the selection of particular values for these variables would not necessitate any undo experimentation which would be indicative of a showing of unexpected results.

Alternatively, it would have been obvious to one skilled in the art to employ the specific process parameters which are claimed by the applicant for their plasma seasoning, and plasma etching processes in the process taught above based upon In re Aller. In re Aller is cited of interest to applicant in this regard.

“Where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation.” In re Aller, 220 F. 2d 454, 105 USPQ 233, 235 (CCPA).

Further, all of the specific process parameters which are claimed by the applicant are results effective variable whose value is known to effect both the rate, and the quality of the plasma etching, and plasma seasoning processes.

18. Applicant's arguments with respect to claims of record have been considered but are moot in view of the new ground(s) of rejection.

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19. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

20. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Examiner George A. Goudreau whose telephone number is (703) -308-1915. The examiner can normally be reached on Monday through Friday from 9:30 to 6:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Examiner Gregory Mills, can be reached on (703) -308-1633. The appropriate fax phone number for the organization where this application or proceeding is assigned is (703) -308-3599.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) -308-0661.



George A. Goudreau/gag

Examiner AU 1763